Small Community and Co-Op Wind Projects

Feasibility Studies

Community Renewable Energy Association

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There are several Sizes of Wind Projects

Small Home/Farm projects

- Projects use wind, solar, batteries, and generators to take farms off the grid. Some include net metering.

Small Community/Cooperative Projects

- Support distributed generation and sell power through Power Purchase Agreements with utilities.
- These projects are attractive because they can become community revenue generators, involve schools and local interests, and help supplement future power growth

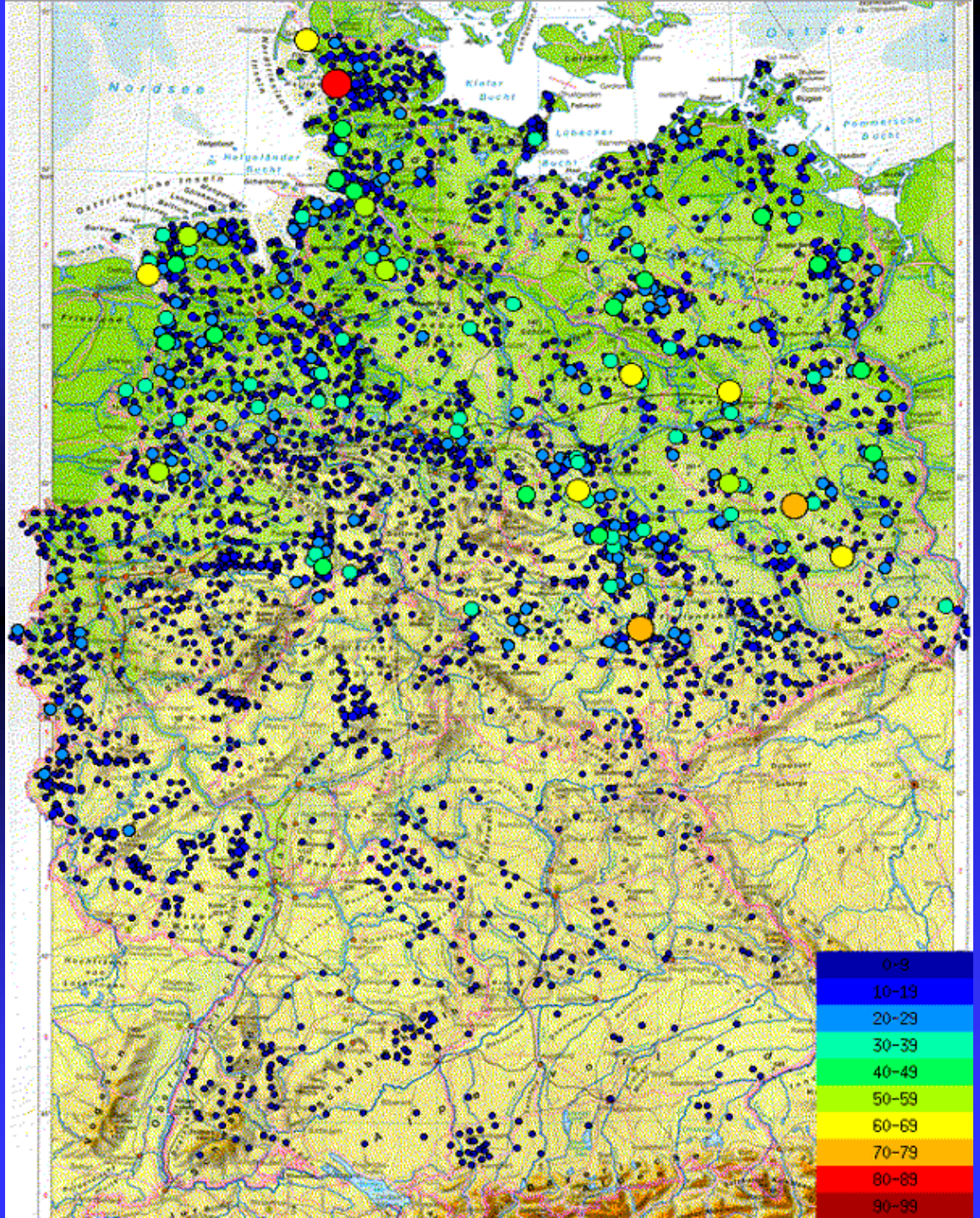
Large Commercial Projects

- Sited in areas of strong winds, transmission access, and market demand.

The Story of a Power System Transformed

.....from centralized generation in the mid-eighties

....into distributed generation (DG) by 2000



WIND ENERGY IN GERMANY: Geographic distribution of 20,485 MW, 18,433 wind turbines; March 1, 2007 (numbers in MW)

Purpose of Wind Power Feasibility Studies

Wind projects are financially viable when there is a Power Purchase Agreement (PPA) with enough price to finance a project

Feasibility studies help determine:

- Power Purchase interest
- Transmission Access
- Wind Resource
- Project Development Costs
- Project Financing

to determine if a project is financially viable

Feasibility Studies

Feasibility Studies are generally divided into several Phases

Phase I

- Preliminary magnitude-of-scale cost estimates
- Exploration of potential Power Purchase interest
- Evaluation of funding – grants, loans, equity
- Economic Modelling to determine project viability

Phase II

If the project appears viable

- Firm up project design and cost
- Help finalize PPA's
- Finalize Economic Modelling to secure financing
- Help secure project financing

Feasibility Studies

Preliminary Studies

- **Power Purchase Potential**
  - Each State has different rules for power sales. Know your state's rules before you spend any time on other feasibility issues.
- **Transmission**
  - Know early on if your site is close enough to correctly sized transmission to accommodate project
  - Work with utility to determine line load capacity
  - If promising, Initiate preliminary utility transmission studies
- **Wind Regime**
  - Work with meteorologist to install met towers in potential site locations.
  - Collect and analyze wind data.
  - The wind regime should be confirmed well in advance of other activities
  - At least one year of met data from the site or meteorologist correlated data from other local sites.

Feasibility Studies

Preliminary Studies

- **Turbine Selection**
  - Develop equipment bids for potential turbine manufacturers
  - Turbine choices are guided by wind regime, desired power production, and turbine specifications (reliability, power curves, performance, etc.).
  - Turbines are scarce for small projects at this time.
- **Site Layout**
  - Develop preliminary project concept designs:
    - Maps
    - Balance of Plant
      - Roads, turbine pads
      - Electrical Infrastructure
      - Sub-station /interconnection point

Feasibility Studies
Balance of Plant Estimates

- **Cost Assessment**
- Develop order-of-magnitude project cost estimates
- Project Management costs
- Turbine Installation
  - Erection Crews
  - Cranes
  - Foundations
  - Civil Engineering and construction (roads, crane pads, etc.
  - Commissioning

Feasibility Studies
Balance of Plant Estimates

- **Electrical**
  - **Design and Construction estimates of**
    - **Electrical infrastructure**
    - **Wind farm/Utility inter-tie**
    - **Flicker study**
    - **Sub-station – metering**
    - **Utility revenue metering – safety trip schemes, etc**
- **Permitting Costs**
  - **Environmental requirements**
    - **Avian studies (site Dependant)**
    - **Cultural and vegetation studies**
  - **Local and/or State permit process – Conditional Use**
  - **FAA permit and lighting requirements (turbines over 200‘ high)**

Feasibility Studies
Financial Estimates

- **Financing**
  - Determine Financial path to fund project
  - **Equity** participants
    - ITC, grants, accelerated depreciation, etc
  - **Debt** participants
    - Bank Loans, etc
  - **Other funding**
    - USDA VAPG's, REAPS
    - government grants, Green Tags, State Incentives

- **Financing**
  - Financial Institutes look for:
    - **Well defined wind regime** with 1 or more years of production level wind data
    - **Power Purchase price** and **length of contract** sufficient to provide debt coverage. **10-15 yr** loans typical
    - **Permits** and **Environmental** details

Feasibility Studies

Economic Analysis

- Economic Models typically look at:
  - Project development costs, equity, and debt
  - Projected cash flows, debt maintenance
  - Production Tax Credits, ITC & Grants, Accelerated Depreciation
  - Operating Costs, Land owner lease costs
  - Anticipated Power production and sales
- Models can vary multiple inputs to evaluate various scenarios to find optimum project economics

Completion of Feasibility Studies

A good feasibility study determines if a project is viable. It provides investors and financiers with the details necessary to commit to a project.

A business plan is developed and construction financing obtained.

Power Purchase contracts, turbine purchase, and other project costs can be secured and the project construction started.